Analysis of Archived Samples to Assess Patterns of Historic Invasive Bivalve Biomass

#0078

Technical Panel Review

Proposal Name: Analysis of Archived Samples to Assess Patterns of Historic Invasive Bivalve Biomass

Applicant Organization: California Department of Water Resources

Principal Lead Investigator(s):
Messer, Dean

Amount Requested: $219,822

TSP Panel Summary of Findings:

The proposed study is very straightforward and as such involves a simple yet easy to understand set of four research hypotheses. The nature of the project is such that obtaining success in developing the Corbicula/Corbula biomass estimates is very likely. Both species are important components of the pelagic food web and are implicated in lack or loss of phytoplankton. Strengths of the proposal include the high relevance of results for CALFED and for the PSP in particular (regarding invasive aquatic species), and the likelihood of success, since all sampling has already been accomplished and the project team have demonstrated their high level of accomplishment and expertise with regard to project goals. Furthermore, the value of the data relative to the funds being requested is high, since the samples have already been collected, and DWR and USGS are providing cost−sharing (including some salary from DWR).

The drawback to this proposal comes from expanding those biomass estimates to make larger inferences about how the variation of the invasive bivalves is related to other environmental variables. Two external reviewers had concerns that developing inferences and thereby testing the research hypotheses might be difficult because of the uncertainty of matching the historical Corbicula/Corbula samples to other environmental data. Indeed this was difficult to ascertain from the proposal given that the section on supporting information was two brief generic paragraphs. Further, there

is some concern about the replication in the archived Corbicula/Corbula samples allowing for estimates of errors. This latter concern might be addressed by pooling of samples.

A related point is that Dr. Messer did not provide much if any information on the proposed statistical methods. The proposal does not address the question of why it is necessary to analyze every month from a 30 year time period. Since the second data set is only from April and July 2005 ("spring" and "summer"), another approach would be to analyze the data quarterly over the 30 years. Furthermore, if 2 samples are available from a single month, then it would be possible to estimate within−month variability ("error"). From a statistical point of view, 2 samples per month would be preferable.

The investigators do not adequately describe the spatial configuration of the six "neighborhoods" sampled in 2005 (within a neighborhood), and how they will analyze the data, though they do mention "spatial gradients." The Executive Summary states that analyses will address response to drivers, both abiotic and biotic, response to a changing environment, implications for management strategies, including restoration of natural processes and habitats. However, such analyses, though highly valuable, are not described in the proposal. Instead, the project description focuses on estimating biomass. The conceptual model is satisfactory, but the panel recommends that more attention be paid to dispersal.

Thus overall, this potentially worthy proposal is somewhat diminished by vagueness in key points. In short, important data will be obtained, but the proposal does not describe how these data will be tied into other components of the food web (predators, prey). There is little discussion of the statistical analyses to be carried out, with little information on the independent variables (and how they will be obtained), or the types of spatial analysis to be carried out.

The panel recommends: − Consider analyzing data quarterly − Consider analyzing two samples per month

Relevance to PSP Topic Areas:

Moderate

TSP Technical Rating:
Above Average

TSP Funding Recommendation:
Fund

TSP Amount Recommended: $**219,822**

Conditions:

External Technical Review #1

Proposal Title: Analysis of Archived Samples to Assess Patterns of Historic Invasive Bivalve Biomass

Proposal Number: 0078

Proposal Applicant: California Department of Water Resources

Purpose

Comments	**Goals clear and well-circumscribed; as expected from these authors they promise only what they know they can deliver. The goals are exceptioanlly relevant to both long term habitat restoration, as the authors say, but also relate to short-term issues of water project impacts on modifying bivalve distributions and impacts. The results will substantially improve our base of understanding of benthic ecology.**
Rating	**Superior**

Background

Comments	**Conceptual model is clear, incorporating the work of this project and its ties to larger issues. The discussion is quite clear.**
Rating	**Superior**

Approach

Comments	**The project is limited by the fact that the long term archived data is used from only two sites, so that spatial variation from year to year is minimally addressed. Similarly the intense spatial data is from a single year so temporal variability of spatial patterns cannot be well-addressed. Despite these shortcomings in the available material, the combination is still likely to substantially improve our understanding of invasie clam dynamics.**

Rating	**Above Average**

Feasibility

Comments	**Very Feasible. Success of targetted goals almost certain.**
Rating	**Superior**

Budget

Comments	**The project provides a lot of cost sharing and results in a very high return on investment.**
Rating	**Superior**

Relevance To CALFED

Comments	**The proposal directly addresses impacts of invasive species (two of the most important species in this regard) and puts them in the context of changing environemtns and basic autecology. While not directly dealing with listed species, the results support important knowledge gaps regarding listed species. The project derives a lot of its value by using and synthesizing data and samplesthat are already in hand. Thus, the costs of collections, etc. are already covered, allowing this project to add consdierable value. The project addresses issues that directly affect water management operations and ecosystem restoration.**
Rating	**Superior**

Qualifications

Comments	**Outstanding. These authors are the experts on the topic and have published extensively. All infrastructure needs are taken care of.**
Rating	**Superior**

Overall Evaluation Summary Rating

Comments	**The project is very simple and un-flashy. Simply translating abundances of archived benthic samples into ecologically relevant measures of biomass. The authors then propose to relate these ecologically significant data to relevant geographic and physical variables. The overall contribution is likely to prove very relevant to many CalFed actions in the future.** **The only limitaiton is that variance through space and variance through time cannot be very well considered together, but by doing each separately substantial prorgress will be made.**
Rating	**Superior**

External Technical Review #2

Proposal Title: Analysis of Archived Samples to Assess Patterns of Historic Invasive Bivalve Biomass

Proposal Number: 0078

Proposal Applicant: California Department of Water Resources

Purpose

Comments	**The goals, objectives and hypotheses are clearly stated. The objectives of this proposal are to obtain invasive bivalve biomass data from previosly collected benthic samples, make the data available, and use the data to evaluate trends in invasive bivalve species over the last 30 years. The authors intend to test four hypotheses: 1) Biomass varies in relation to season and hydrographic year type. 2) Biomass has vaied with mean annual river flow. 3) Biomass varies among habitat types and sub−habitats. 40 Biomass and abundance are divergent.** **This study is important and timely because the impacts of invasive bivalves on the ecosystem could be contributing to the decline of pelagic organisms.** **Some of this work has apprently already been done for some months of 1988 through 2006. The authors have not justified examination of every month for the last 30 years in order to make some predictions.** **The selection of a research project, as opposed to a pilot, demonstration or full−scale implementation project is justified.** **Results will add to the base of knowledge about invasive bivalve populations over time. However, do not list any peer−reviewed publications in their Deliverables section.**

	This project is very straight−forward and will not generate any novel methodology or approaches. As mentioned before, some of this information has already been generated. Novel information could be generated if the authors used the data to predict the impacts of bivalve populations in response to things like differing water management strategies or climate change. However, it is not clear if or how they would do this.
Rating	Sufficient

Background

Comments	A conceptual model is clearly stated in the proposal and explains the justification for the proposed work. Sufficient other information is provided to understand the basis for the proposed work.
Rating	Above Average

Approach

Comments	The primary approach is to examine existing benthic samples to determine invasive bivalve abundance and biomass. It is unclear how the original sampling was performed, whether sampling methods were consistent over the 30 years, and therefore, whether the authors will actually be able to report biomass or abundance on a per square meter basis. Trends in biomass over physical and biological gradients will then be analyzed, although the authors do not describe how that will be done. Dr. Messer will be performing managment tasks and administration of the project, as well as data analysis and reporting. Funds are not specifically set aside for management and administration, but Dr. Messer is requesting some salary. In addition, funds are requested for travel to conferences, although this is not described in a detailed budget justification.
Rating	

	Inadequate

Feasibility

Comments	**Although the authors have a section titled "Completability", they do not specifically discuss feasibility or discuss what potential problems they might run into and how they might deal with those problems, should they come up. This is rather short-sighted. What if, for example, the existing samples are in such a condition that the authors cannot say anything about biomass or abundance per square meter?** **And again, I am not convinced that it is necessary to examine EVERY sample from the last 30 years in order to reach their objectives.**
Rating	**Inadequate**

Budget

Comments	**The authors are primarily requesting salaries, as space and equipment are being provided. I am surprised that they did not ask for at least a little money for expendable supplies. $15K is requested for travel and publications, but no justification is provided.**
Rating	**Sufficient**

Relevance To CALFED

Comments	**This proposal addresses the priority of Aquatic Invasive Species. The authors also state that this proposal addresses Trends and Patterns of Populations and System Response to a Changing Environment, and Habitat Availability and Response to Change. These later two priorities are only addressed if the authors construct a predictive model based on their findings. It is not apparent that they will do this. However,**

	the information may ultimately be somewhat useful to CALFED resource managers and policy makers.
Rating	**Sufficient**

Qualifications

Comments	**The project team will include Dr. Messer, Ms. Gehrts, Ms. Peterson, Dr. Vayssieres, and Dr. Thompson. The authors did not summarize their qualifications in the text and a full CV is only provided for Dr. Messer. Dr. Messer currently workds for the California Department of Water Resources and is Chief of the Monitoring and Analysis Section. Ms. Gehrts has published on phytoplankton and benthic monitoring. Ms. Peterson completed a masters on benthic community change in an invaded estuary. Dr. Vayssieres is an Environmental Scientist and has published on a wide range of topics. Finally, Dr. Thompson has published on the Asian clam invasion of San Francisco Bay. Therefore, the project team is qualified to imlement the proposed project.** **Infrastructure and other aspects of support are apparently being provided, but are not described.**
Rating	**Above Average**

Overall Evaluation Summary Rating

Comments	**Although I think this could be an interesting and useful project, I am rating it as "Sufficient" , rather than a higher rating, for the following reasons:** **1) I was not convinced that they can get the data that they intend from the historical samples, which are not described. 2) The authors do not describe how they plan to address or test the implications of management**

	strategies or driver/response relationships, other than to say that they will be "discussed".
Rating	**Sufficient**

External Technical Review #3

Proposal Title: Analysis of Archived Samples to Assess Patterns of Historic Invasive Bivalve Biomass

Proposal Number: 0078

Proposal Applicant: California Department of Water Resources

Purpose

Comments	**The purpose of the study is to utilize a long-term, archived collection of benthic bivalves (mostly invasive species) to estimate bivalve biomass. Various hypotheses regarding spatial and temporal variation in biomass are posed. Patterns of variation will be related to flow, habitats, substrate and bathymetry.** **There is justification for this study given the existence of an archived collection. Few studies with such a long record exist and the possibility of linking changes in benthic populations with events in the pelagic is most appealing. Therefore at face value, the project has potential and could generate new information.**
Rating	**Above Average**

Background

Comments	**Most of the information needed is well explained. However, the proposal does not do a good job of explaining a few things as follows:** **How were bivalves sampled (with what kind of sampler)? Were samples replicated (it appears that they were not)?**

	Is there an equivalent database for pelagic communities and processes (e.g., phytoplankton, zooplankton, or fish species abundances or primary production) to relate to benthic standing crop)? **It is not clear who or how the questions posed regarding spatial variation and bivalve biomass will be addressed (e.g., who will examine flow patterns and benthic biomass and with what database)? What types of data analysis (or statistical approaches) will be used to link these factors?**
Rating	**Inadequate**

Approach

Comments	**The approach is straightforward and the authors do a good job of detailing who will do what. The product of the project depends on how good data are. My biggest concern is that it will be difficult to generate error terms around biomass estimates. The authors briefly discuss sources of error but, as I see it, only one sample per locale was taken and the question of error was not directly considered. Error could be estimated with models that take into account variability between sites or within sites among years, but this does not appear to be a goal of the project nor do personnel appear to be adequate to do this. Without error, the project will not be as important.** **The plan for dissemination seems adequate however publication will be essential to distribute the information to a wider group of scientists. Contributions to larger data management seem adequate.**
Rating	**Sufficient**

Feasibility

Comments	**The project is feasible because the archived collection. The authors have the technical ability to do the analysis/measurement of biomass. The scale of**

	the project is reasonable.
Rating	Superior

Budget

Comments	The budget seems clear however it seems high. I wondered how many bivalves will be measured? Could the authors randomly select a subset of specimens to reduce time and effort?
Rating	Sufficient

Relevance To CALFED

Comments	This proposal fits very well into the stated priorities. Two areas seem very well suited – invasive species and habitat availability and response to change (given the long-term nature of the data set to be analyzed). The proposed research should be useful to resource managers who want to know more about trends over time and how the system functions regarding benthic and pelagic use of pelagic primary production. However the lack of error terms does reduce the overall significance of the results.
Rating	Sufficient

Qualifications

Comments	It appears that the track record is weak in terms of papers in referred journals. However the basic expertise is available to do the necessary research. The infrastructure seems to be in place, especially in terms of finding interns.
Rating	Sufficient

Overall Evaluation Summary Rating

Comments	**Measuring biomass from an archieved collection over a long time record with a complex spatial pattern of samples is a important opportunity to learn more of the ecological function of the area of interest. Invasive species will be examined and the ability to measure biomass has well documented – it is feasible. But the success of the project depends on how data will be used. It is less clear if the interest in examining spatial patterns of biomass will be brought to fruition or if complex statistical or modeling procedures can be brought to bear on relationships with environmental factors. Are users looking for such data? One major problem appears to be a lack of replication in the basic data set. There are a lot of samples and error might be estimated in other ways but this is not documented by the authors. Nor are potential users of the information well documented.**
Rating	**Sufficient**